

Drop by Drop: First Graders Learn about Water, Sanitation, and Conservation

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This is my school,
This is my school,
My place to work and play.
My friends and I are living out each day.
Washing a table, polishing a cup,
Everyday I'm growing up!¹

As part of their classroom responsibilities, children at Coastal Empire Montessori Charter School in Savannah, Georgia, wash dishes, care for classroom pets (including rats, fish, snakes, parakeets, finches, bearded dragons, tree frogs, geckos and more!) and tend the raised gardens located behind each classroom cottage. Coastal Empire's mission, "to educate the whole child for the world," is reflected in the carefully prepared classroom environment and daily learning opportunities designed to instill within students a love for the natural world.² By nurturing a sense of respect and value for self, others, and the world, teachers encourage children to become stewards of their school and home communities. Developing young children's sense of responsibility (understanding that their actions can have important and enduring impacts on others and on the environment) is a core value of Montessori education.

The U.S. Fund for UNICEF collaborates with schools like Coastal Empire to develop and implement PK-12 global education resources through its TeachUNICEF program.³ These free, online resources focus on critical global issues such as poverty, health and nutrition, children's access to education, and water use and sanitation.

As an assistant professor at the University of North Carolina Wilmington, North Carolina, I (Elizabeth) was invited to write a TeachUNICEF unit of study for pre-K-grade 2 classes, "Water and Sanitation for All: Bringing the Issue Home."⁴ Teachers who wish to use any or all of this material can download it from the TeachUNICEF website, which also includes supporting materials such as pre- and post-assessment questions and downloadable photographs and handouts.

This article details the collaboration between the co-authors—a university faculty member and first grade teacher at Coastal



Grades K-2 students in Savannah, Georgia, learn first-hand about the water cycle and how to care for plants daily.

Empire—who co-taught the first three lessons in the fall of 2009, then re-visited the topic in the spring of 2010, with the fourth and final lesson coinciding with World Water Day, celebrated annually on March.⁵

How We Learn

TeachUNICEF is built on a theory that learning proceeds from understanding, to personal response, to informed action. Thus, each of the unit’s four lessons builds students’ prerequisite knowledge about global water issues from a local to global level in order to evoke a personal response, and to enable each student to take informed action. The unit’s goals, essential questions, big ideas, and learner objectives all flow from that approach. (Sidebar A)

Concept mapping served as a curriculum development tool to “unpack” and sequence the lesson content and to teach children about water concepts and the relationships between concepts. During some of the following lessons, students and their teacher labeled UNICEF photographs of families and children around the world using words and concepts in each lesson. Once completed, a concept map was displayed on the classroom wall for several weeks.

“Water and Sanitation for All” was designed for use by primary grades teachers to introduce and reinforce concepts that are often included in the typical curriculum. For example, the study of water reinforces elementary science concepts (e.g., temperature, the needs of plants and animals, the states of matter, the hydrologic cycle, water pollution); language concepts (e.g., the prefixes hydro- and aqua-); math concepts (e.g., measurement and addition); and practical life skills (e.g., washing a table, caring for plants and animals, and responsible hand washing and tooth brushing). In social studies, this unit of study reinforces the thematic strands: ● PEOPLE, PLACES, AND ENVIRONMENTS; ● SCIENCE, TECHNOLOGY, AND SOCIETY; and ● GLOBAL CONNECTIONS.⁶

Teaching Lessons about World Water Issues

Lesson 1: Our Blue Planet—Water on Earth

2 hours over 2 days

Our introductory lesson was framed by the following questions: Why is the Earth sometimes called the “Blue Planet”? Where is water located? How do plants and animals use water? How much clean, fresh water is available for drinking, cooking, bathing, and playing? (Sidebar B)

Children explored the answers to these questions as a class, with individual follow-up conversations continuing throughout the week. Using a globe, first graders identified the many bodies of water covering the Earth’s surface. Living in a coastal area, most children were very familiar with the Atlantic Ocean, and were eager to discuss their daily interactions with this precious natural resource.

A whole class read-aloud of *Water, Water Everywhere*, with its striking photographs of water around the world, provided an age-appropriate overview of water-related concepts to be

addressed throughout subsequent weeks. Students’ drawings and their informal conversations revealed many first graders’ understanding of the necessity of clean water for all living creatures, not only people. For example, one child drew a dolphin in the Atlantic Ocean—“It lives in water,” she explained.

Following this introductory lesson, first graders spoke of the importance of water on Earth for all living things and how the clean, safe water sources on our Blue Planet are limited. Only a small fraction of the Earth’s water is drinkable. The oceans, for example, are salt water. Many rivers are polluted, and the water must be filtered and chemically treated before we can safely drink it.

As a method of informal assessment children were routinely “interviewed” using the Voice Memos app on a smart phone. The children enjoyed the interviews, and then listening to the recording. (And as educators piloting this curriculum for the U.S. Fund for UNICEF, we found that the recorded interviews gave us valuable insights into students’ understanding of the material.)

Lesson 2: The Never-Ending Water Cycle

3 hours over 3 days

Understanding the interconnectedness of life on Earth is essential to a child’s development of global awareness. In our second lesson, we introduced the water cycle—water precipitating from clouds as rain; moving through land and living things; gathering in lakes, rivers, and the oceans; and evaporating upwards to form clouds again. We emphasize that pollution occurring in one geographic area may eventually affect life in far-away places. Because all water is connected, we are all connected.

A common (and potentially dangerous) misconception among children is that clear (non-murky) water must be clean water. So we defined the concept of limited “potable” water as clean, safe drinking water. We displayed a pitcher of tap water and a blank Y chart. Where do you think this water came from? How do you know if it is safe for drinking? Children volunteered the following water sources: the sink or faucet, melted ice, the ocean, a river, stream, or lake, and the hose or sprinkler.

Children’s perceptions of the water’s potability appeared to correlate with its perceived source. They believed that lake water and saltwater are unsafe for drinking, for example, because animals may pollute the water, or the water tastes “spicy.” In contrast, first graders perceived that water from the faucet is safe for drinking because “it comes from the pipes.”

Some students expressed their prior knowledge about America’s water supply and sanitation facilities. As one first grader explained:

The man at the water place puts this medicine in it that makes it good for you. If the water wasn’t safe to drink then we would all be sick, and we aren’t, so it must be okay. [However] don’t drink water from the hose because it has been laying in the sun and it might burn your mouth. Water from the hose might



have a surprise in it, like a baby frog. You don't want that in your mouth.

Discussions followed about the safety of drinking water supplied through a hose. Some students disagreed with the speaker, stating that they regularly drink water from the hose during the summer when it is hot outside and they are playing. Unfortunately, drinking from a hose is usually not safe. Substances used in vinyl garden hoses to keep them flexible can get into the water as it passes through the hose. These substances may be harmful to people or pets.⁷ And, yes, we certainly don't want to drink moldy water or baby frogs that may have crawled into a hose on the lawn! Children should go indoors and drink from the tap, or take along a thermos of drinking water with their name on it when they go outside. Some playgrounds have reliable drinking fountains, but such durable public facilities are, sadly, missing in many U.S. communities today.⁸

Once we discussed safe sources of drinking water, each child sipped from a paper cup of water and described the water's characteristics—what potable water looks like ("clear"), tastes like ("nothing"), feels like in their mouth ("smooth"). They compared it to water they drink at home.

A second pitcher of apparently pure water provided a useful example of a chemical in solution. The teacher had dissolved sugar in the water without the children's knowledge. Because they could not see any substance in the water, the first graders assumed it was plain water. After sipping from a cup of this water ourselves, we asked a student volunteer to sample the water and to describe its flavor. Then everybody had a taste from his or her own cup.

In discussion, we made the connection between the pitcher of clear, sugary water and other visibly clear waters that could contain unknown, and often unsafe, substances such as lead or germs. In other words, not all "dirty" water looks "dirty." Clean-looking water from unsafe sources can be unclear.

In the days following, we reiterated the main points of these lessons: soluble materials, unseen pollutants, and the never-ending water cycle on Earth. Instructional materials, including the Sesame Street video "All About Water" and reading aloud from the book *One Well: The Story of Water on Earth* helped children understand that because all water is connected, we are all connected.



Lesson 3: Safe Waters, Healthy Communities 2 hours over 2 days

In our third lesson, we explored water-related issues that affect people in communities worldwide. As an introduction, we displayed age-appropriate photographs showing water sources and issues such as drought and water pollution. The images are available at the UNICEF photo essay "Children and Water."⁹ Together we discussed questions such as: What examples do you see of people using water? What are different ways people get their water? What happens when people do not have enough water, when water is scarce? What happens when people have too much water,

when there are floods? How does dirty water affect people and other living things all around the world?

A photograph of children transporting water in Peru sparked a rich discussion of the role some children play in communities that lack easily accessible clean water, as well as a lesson in geography (as most of these students were unfamiliar with

South American countries).

First graders' responses to this photograph included:

They are carrying water from a lake in their buckets because they don't have pipes at their house for water to come out of.

They are bringing water home from a well that someone dug. They have those in the country where my grandma lives.

They are bringing water home to their families to cook and wash with. They live somewhere without pipes so they have to go to where the water comes from. There must be a lake or river nearby.

The photographs illustrated the point that the quality and accessibility of a community's water supply affect the health of its people, even its youngest citizens.

The final segment of this third lesson focused on responsible water use and sanitation. We incorporated the popular Sesame Street song in our daily practice of proper hand washing with soap and water:

Wash, wash, wash my hands
Make them nice and clean!
Rub the bottoms and the tops
And fingers in between.

In the first grade, we defined germs as living things that are so small that we can't see them. Some germs cause disease. When you wash your hands carefully with soap and warm water, you are removing not only the dirt that you can see, but also tiny germs that could have made you sick.

Lesson 4: Water Care and Conservation

2 hours over 2 days

Nearer to the end of the academic year, we taught a culminating lesson, "Water Care and Conservation," in preparation for observing World Water Day. This international holiday is celebrated annually on March 22nd to raise awareness about the importance of clean freshwater and how we must use it responsibly for the health of each other and our planet.

In this lesson, first graders learned about individuals (such as Nobel Prize winner Wangari Maathai)¹⁰ and groups (such as UNICEF) that work to improve life for Earth's living creatures and the environment. To review the concept of conservation, we had students read *Common Ground: The Water, Earth, and Air We Share*. We then facilitated a whole group discussion and recorded children's ideas on a blank concept-definition map.

Concept-Definition Map

Conservation Examples

- Turning off water when not in use (e.g., while brushing teeth)
- Taking short showers
- Disposing of lots of paper

Non-examples

- Watering the grass when unnecessary
- Leaving the sink running
- Leaving the hose on when you go to sleep

Making connections to previous learning, children gave examples and non-examples of conservation. When asked, Why do you think conservation is important?, children expressed the necessity of conservation, defined by our first graders as "a way to use our natural resources in a good way so that they don't go to waste." Their comments indicated their understanding that our natural resources are limited, and we must conserve them for a "clean and healthy" earth.

To reinforce informed action, the first graders reflected on the question: How can you help to conserve water and other natural resources? We pledged to implement the ideas already on the chart, and the children acted on others as well. For example, we observed children watering classroom plants with their excess drinking water and reminding their peers to turn off the outdoor spigot or classroom faucet when not in use. The class also decided to place five-gallon buckets under the air conditioning units outside to collect the run-off water that otherwise would have been wasted. First graders "recycled" this condensate by transferring it to the school gardens in small watering cans. This practice continues today.

Every Day

These focused learning activities helped first graders to recognize how essential and limited is the supply of potable water worldwide. Daily conversations and behaviors revealed that young children became more aware about this critical issue and became empowered to make a positive difference. In the spirit of celebrating World Water Day "today and every day," we continue to involve children in finding unique solutions to the global water crisis at a local level.

Children at Coastal Empire weren't just told how to behave. They were brought to awareness about WHY they are conserving water, WHY it is better to get water for our plants from buckets set up outside as opposed to the faucet, WHY we don't leave the sink running while washing our hands or doing dishes. Telling them to do these things wasn't enough. We had to give them a reason to care and want to bring these core values to bear in their own lives.

Our students will become stewards of the future Earth. We hope that they will act upon the values of World Water Day and

Earth Day every day of their lives. Indeed, as engaged global citizens who are capable of taking informed action, children at Coastal Empire demonstrate the value of conserving our limited natural resources—drop by drop. 🌍

Notes

1. Jones, Sanford. “This is My School,” *Children’s Songs* (Youth Opera International, Inc., 1976). The CD is available for purchase at www.youthoperaintl.com.
2. Founded in 2008 and currently attended by 277 children, Coastal Empire is a relatively “new,” preK-3 public charter school grounded in century-old Montessori philosophy and methods.
3. TeachUNICEF classroom resources (www.teachunicef.org) are available online free. If you are interested in piloting classroom resources that are now under development, please e-mail teachUNICEF@unicefusa.org.
4. “Water Use and Sanitation for All: Bringing the Issue Home,” teachunicef.org/sites/default/files/units/Water-and-Sanitation_PreKto2.pdf
5. IRC International Water and Sanitation Centre, “World Water Day,” www.worldwaterday.org/. To plan your own World Water Day 2012 classroom event, visit www.unwater.org/worldwaterday/.
6. National Council for the Social Studies, *National Curriculum Standards for Social Studies: A Framework for Teaching, Learning, and Assessment* (Silver Spring, MD: NCSS, 2010).
7. Fairfax (VA) Water Authority, www.fcwa.org/water/faq.htm. Special garden hoses that are safe for human use can be purchased, but these are not the majority of hoses.
8. Bottled water is an alternative, but it’s expensive, and the plastic litter are a major source of pollution and fossil fuel consumption. Steven S. Lapham, “Bottled or Tap? A Controversy for Science, Economics, and Society,” *Social Education* 73, no. 5 (September 2009), pp 236–239.
9. U.S. Fund for UNICEF, “Children and Water” (photo gallery), www.unicef.org/photoessays/31695.html.
10. Iftikhar Ahmad, “Nobel Peace Laureate Wangari Maathai: Connecting Trees, Civic Education, and Peace,” *Social Education* (January-February 2005).

Children’s Literature and Videos

- Molly Bang, *Common Ground: The Water, Earth, and Air We Share* (New York: Blue Sky Press, 1997)
- Mark J. Rauzon and Cynthia Overbeck Bix, *Water, Water Everywhere* (New York: Sierra Club Books, 1995).
- Rochelle Strauss, *One Well: The Story of Water on Earth* (Toronto: Kids Can Press, 2002).
- Sesame Workshop*. “Wash Your Hands.” (Video). August 10, 2011 from www.sesamestreet.org. See other water-related videos at this website.

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Water and Sanitation for All: Unit Overview

www.teachunicef.org

The Four Lessons

Each lesson includes its own Big Idea; Learning Objectives; Vocabulary; Materials and Setup; and Procedures (with an introduction, development, and closing).

Lesson 1: Our Blue Planet—Water on Earth: Children develop awareness of the importance of water on Earth for all living things. They learn that clean, safe water sources are limited; therefore, they must develop responsible habits when using water.

Lesson 2: The Never-Ending Water Cycle on Earth: Children are introduced to the water cycle. They learn that all water passes through a continuous cycle and that water exists in three states: solid, liquid, and gas.

Lesson 3: Safe Waters, Healthy Communities: Children are introduced to causes and effects of water issues, including drought, flooding, and polluted waters. They develop awareness of the importance of responsible water use and sanitation, including hygienic practices such as proper hand-washing and safe waste disposal.

Lesson 4: Water Care and Conservation: In this culminating lesson, children learn about the importance of conservation of natural resources. They explore ways to conserve water and develop awareness of the work of organizations such as UNICEF that bring water, sanitation, and hygiene to children worldwide. Children share their learning as they help to plan and participate in World Water Day (March 22) or another water awareness event.

Goals for the Whole Unit

- To raise awareness of the problems facing children with inadequate access to clean water or sanitation facilities.
- To increase students’ understanding of the world water crisis as one that affects everyone.
- To explore how organizations, agencies, and individuals are working to address the problems.
- To encourage students to take their own steps in addressing the local and global issues of water and sanitation.

Essential Questions to Revisit During the Lessons

- How do animals and plants use water? What happens if they do not have enough clean water?
- Where is water located? Where have you seen water? Where does it come from?
- What different forms does water take? What causes water to take different forms?
- How do you use water? How can you use water properly to be healthy and to ensure that plants and animals have safe, clean water they need?
- How do community helpers keep our water clean and safe for drinking, bathing, and other activities?

See also the Big Ideas and Learner Objectives listed at teachunicef.org/sites/default/files/units/Water-and-Sanitation_PreKto2.pdf